

Protocol Development Summary

NETN protocol: Landscape Dynamics

NETN parks where protocol will be implemented:

Acadia NP (ACAD), Marsh-Billings-Rockefeller NHP (MABI), Minute Man NHP (MIMA), Morristown NHP (MORR), Roosevelt-Vanderbilt NHS (ROVA), Saint-Gaudens NHS (SAGA), Saratoga NHP (SARA), Weir Farm NHS (WEFA)

Justification/issues being addressed:

Many of the parks in the NETN are subject to encroaching residential and urban development, and recognize that these landscape issues are closely linked to park ecosystem functionality. Thus, land-use change is given a high priority for long-term monitoring within the NETN's Vital Signs Monitoring Program. Land use change within and outside of parks can have a major impact on the ecological processes and functions within parks. Long-term monitoring of landscape-level indicators of relevant land use change over time can help managers to determine patterns in land use change which may threaten future ecological integrity within parks.

The NETN is currently collaborating with the University of Rhode Island to analyze landscape change between 1972 and 2002, and the results of this analysis will be used to inform the development of specific land use change metrics that will be evaluated in the future.

Specific monitoring questions and objectives to be addressed by the protocol:

1. Determine current land use and ecological cover types within and adjacent to NETN parks.
2. Develop a long-term data set documenting changes in land use and ecological cover types within and adjacent to NETN parks.
3. Quantify trends in relevant land use and cover metrics, including habitat conversion and loss, fragmentation, and reduction in functional ecosystem size (e.g., core area).
4. Correlate land use and land cover trends with trends in monitoring data by analyzing land change within buffers centered on individual long-term monitoring plots.

Basic approach:

We will use the best available remote sensing data to document landscape change at intervals of five to ten years. Data will be interpreted according to current standards so that the resulting map of land use and ecological cover types will be as accurate as possible. Because remote sensing methods are constantly evolving, it is unrealistic to expect that raw data and processing methods will remain constant between sampling periods. Similarly, we expect that the specific metrics used may change over time, and each analysis may involve re-calculating metrics based on earlier landscape layers to obtain estimates of change in the metrics. We expect to use several categories of landscape metrics, including land use, habitat area, habitat configuration, and fragmentation metrics.

Landscape metrics will be evaluated for each park as an entity (e.g., changes in urbanization around Acadia National Park). This level of analysis will provide some general information about the extent of changes that will be relevant to park ecosystems. However, this analytical scale is not appropriate for testing hypotheses about the causes of trends detected in monitoring data (e.g., forest condition metrics). Hypothesis testing will require plot-based analyses, such as documenting fragmentation levels within 500 m of each permanent monitoring plot. These sorts of analyses can be automated using current software (e.g. FRAGSTATS and ArcGIS).

The national I&M program is currently investigating procedures for obtaining land use and land cover data on a regular basis, and our protocol will build on the national effort to provide analyses that support the needs of NETN parks.

Principal investigators and NPS lead: This protocol will be developed by NETN staff. The NPS contact is Brian Mitchell.

Development schedule, budget, and expected interim products:

The University of Rhode Island landscape change project will finish in 2006. We anticipate that the analysis from this project will serve as an initial landscape change analysis, and do not anticipate needing a protocol in place until approximately 2010. We will begin developing this protocol during FY08, by which time we expect to be able to build off of a national landscape change analysis protocol.